

# PATENT ABSTRACTS OF JAPAN

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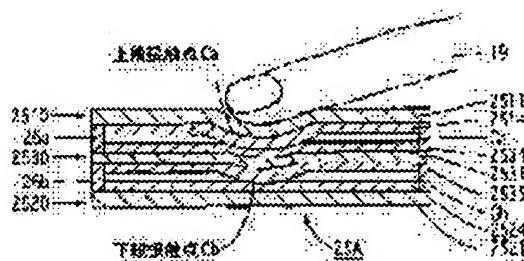
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## (54) INPUT DEVICE

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide an input device with, which a user can surely input data without confusion, when the user performs an input operation and can input data using few simple operations and few finger operations, with respect to a complicated function and which realizes feed back by force sense for the tactile sense of the finer of the user.

**SOLUTION:** In a two-step type touch panel 25A in a first performance form, which is incorporated in the input device 1, uniform gaps Ga and Gb are made from both transparent electrodes across a transparent and flexible intermediate electrode sheet 2530, where transparent electrodes 2534 and 2535 are formed on both faces. A transparent and flexible upper electrode sheet 2510 where a transparent electrode 2514 facing the transparent electrode 2534 is formed on an input operation side, and a transparent lower electrode sheet 2520 where a transparent electrode 2524 facing the transparent electrode 2535 of a display device 24-side is formed are respectively laminated for constituting the touch panel 25A.



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## LEGAL STATUS

[Date of request for examination]

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**DETAILED DESCRIPTION**

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**[Detailed Description of the Invention]****[0001]**

[Field of the Invention] This invention relates to the input unit with which a user can realize that started the input unit, especially alter operation by press was performed certainly.

**[0002]**

[Description of the Prior Art] First, the input unit of the conventional technique is explained, referring to drawing 13 thru/or drawing 20.

[0003] The input unit which showed drawing 13 in the front view of an input unit, and showed drawing 14 to drawing 13 a part An expansion front view, The decomposition perspective view of the display of the input unit which showed drawing 15 to drawing 13, the cross-section side elevation of the display of the input unit which showed drawing 16 to drawing 13, The decomposition perspective view of the one-step touch panel of the conventional technique which constitutes the display which showed drawing 17 to drawing 16, The cross-section side elevation of a display shown in drawing 16 for the cross-section side elevation of the one-step touch panel which showed drawing 18 to drawing 16, and drawing 19 to explain actuation of the one-step touch panel shown in drawing 17, and drawing 20 are the thrust P-displacement delta characteristic curves of the one-step touch panel of the conventional technique shown in drawing 16.

[0004] In drawing 13, a sign 1 points out the input unit of the conventional technique. This input device 1 is used for small pocket mold information input devices, such as an information terminal, the car-navigation system, the computer, etc.

[0005] A frame 11 is combined by the both-sides edge of outside \*\* 10, and this input unit 1 is reinforced at it, respectively while it is equipped with outside \*\* 10 which makes the shape of a flat rectangular parallelepiped. And the display 12 which makes a touch panel serve a double purpose is formed in the top face of outside \*\* 10. While the input panel 13 is formed in this display 12 bottom, two or more operating buttons 14 are allotted under the input panel 13.

[0006] A touch panel function is provided on the display 12, \*\*, the switch, the menu, the icon, etc. and system of coordinates which the display of a display 12 projected correspond by 1 to 1, and an input device 1 receives an input event by pressing the touch panel (postscript) of the part of the item which a user wants to choose with the directions implement 18 or a finger 19, as shown in drawing 14 and drawing 16.

[0007] The display 12 consists of a display panel 24 and a touch panel 25 from the bottom, as shown in drawing 15 and drawing 16. The display panel 24 is made as [ perform / a predetermined display ], and has flat-surface displays, such as a liquid crystal display, an organic electroluminescence display, and a CRT (Cathode Ray Tube) display, a curved-surface display, etc. The touch panel 25 is constituted so that switching operation may be performed with alter operation, and it has a resistance film type and other methods. As shown in drawing 16, such a display panel 24 and a touch panel 25 are piled up, and are used, being stored in outside \*\* 10.

[0008] in addition, the driver circuit for driving the flexible patchboard for a wiring drawer, and a

display to a display panel 24 -- although the pack light sections, such as a light-emitting part, a light guide plate, a diffusion plate, and a booster circuit, were connected further especially about the LCD panel, those illustration was omitted here.

[0009] The touch panel 25 of the conventional technique is equipped only with one step of input functions. That is, if a resistance film type touch panel is mentioned as an example and the structure is explained, as shown in drawing 17 and drawing 18, the top electrode sheet 2510 and the bottom electrode sheet 2520 open few gaps G in homogeneity with a spacer 26 (drawing 19), and are constituted.

[0010] Antireflection films 2512 and 2513 are formed by the outside of the sheet base material 2511 made of a transparent plastic in which the top electrode sheet 2510 had flexibility, and inside both sides, and the transparent electrode 2514 is formed by the front face of the inside antireflection film 2513 of them. As this transparent electrode 2514, an ITO (Indium Tin Oxide: indium stannic acid ghost) thin film etc. is desirable, for example. Similarly, antireflection films 2522 and 2523 are formed by the outside of the sheet base material 2521 made of a transparent plastic in which the bottom electrode sheet 2520 also had flexibility, and inside both sides, and the transparent electrode 2524 is formed by the front face of the inside antireflection film 2523 of them. In addition, antireflection films 2512, 2513, 2522, and 2523 are film for controlling reflection of the transmitted light. Leader lines 2515 and 2525 are drawn by each transparent electrode 2514 and 2524, respectively (drawing 17). And said touch panel 25 is the thing of the structure which both the transparent electrodes 2514 and 2524 were opposed, opened few gaps G as mentioned above using the spacer 26, and has arranged the top electrode sheet 2510 and the bottom electrode sheet 2520.

[0011] Next, actuation of this touch panel 25 and its property are explained using drawing 19 and drawing 20.

[0012] As mentioned above, it is inputted when a user chooses and presses an item, a file, etc. which were displayed on the display 12 with a display panel 24 with the directions implement 18 or a finger 19. That is, the top electrode sheet 2510 of the specific location of a touch panel 25 is pressed by this alter operation, and that transparent electrode 2514 contacts the transparent electrode 2524 of the bottom electrode sheet 2520 by it. An input position coordinate can be specified by measuring the resistance by these both point of contact P.

[0013]

[Problem(s) to be Solved by the Invention] However, in the case of such alter operation, by the touch panel 25 of the conventional technique, if a graph shows the displacement delta of the top electrode sheet 2510 to the push-down force P of the touch panel 25 very thing, it will become the P-delta curve 1 as shown in drawing 20. That is, in the case of the start of push, first, with the elasticity of the top electrode sheet 2510, 1 with a curved small inclination is followed and both sheets 2510 and 2520 contact in an inflection point 2. Furthermore, if it pushes in, the bottom electrode sheet 2520 will be pushed and the inclination of a curve 1 will become larger like a straight line 3. However, it is unclear in whether in the case of such alter operation, the touch panel 25 was turned on to the user at which time, and the input event occurred.

[0014] Moreover, the actuation which continues pushing beyond the combination of a serial input, for example, a certain fixed time amount, when giving this directions of activation etc. or adding different actuation, or continues the same part twice or more in a certain fixed time amount, and is pushed although an item, a file, etc. can be chosen as mentioned above as long as one step of such input units are used was required.

[0015] Quick actuation becomes difficult in order for such an approach to require the fixed real time difficultly on the small display screen in a small pocket device. Moreover, the interruption processing from the timer which measures the real time will hang a load on a signal-processing activity.

[0016] Furthermore, there was no function to return reaction force to a touch panel 25 again to the finger 19 of the user who performs alter operation etc. (feedback), it was the sound outputted from a voice output, and alter operation reception was returned by changing the display of a part of display 12. However, it was unclear for the user whether it was that the actuation itself was accepted in the device

side to the alter operation and the quick alter operation which are performed without a user's looking at a display 12.

[0017] This invention can be inputted certainly, without causing derangement, when it is made in view of such a trouble and a user performs alter operation to a user's alter operation, and, moreover, it can input by easy actuation and little finger actuation also to a complicated function, and aims at offering the input unit which enabled feedback by the sense of force to the tactile sense of a user's finger.

[0018]

[Means for Solving the Problem] Therefore, the input unit of the main patent of this application is related with the input unit equipped with the touch panel with which at least two contacts are formed on the same axis of coordinates in a plane-coordinates system.

[0019] two contacts resemble the touch panel, respectively, and a gap forms in the thickness direction -- having -- \*\*\*\* -- and the touch panel -- the -- at least, an input area-ed is transparent, and suitable for the screen of a display. [ pile up, use and ]

[0020] Moreover, it has the actuator with which said touch panel is interlocked with energization of each of said contact, and operates in the input device of other main patents of this application, and its driver circuit, and said actuator is returning the sense of force from which it responds for every contact on the same coordinate, and a mode of operation changes further again.

[0021] Furthermore, the input unit of the desirable embodiment of invention included in this application again A bipolar electrode sheet with flexibility with the transparent predetermined thickness by which the transparent electrode is formed by both sides is inserted. The transparent top electrode sheet with flexibility with which the transparent electrode which opened the uniform predetermined gap from said both transparent electrodes, respectively, and met one [ said ] transparent electrode at the alter operation side was formed And the transparent bottom electrode sheet with which the transparent electrode which met the transparent electrode of said another side was formed equips the display side with the touch panel which a laminating is carried out, respectively and is constituted, and the bipolar electrode sheet opens two or more sheets and a predetermined gap, is arranged, and is good also as a multistage touch panel. Moreover, the 1st step touch panel consists of said bipolar electrode sheet and said top electrode sheet, and, as for this multistage touch panel, the last stage touch panel consists of said bipolar electrode sheet and said bottom electrode sheet.

[0022] Therefore, if the electrode sheet of the front face where a directions implement or a finger contacts is pressed with a directions implement or a finger according to this invention, the electrode sheet of the front face will be pushed in first, a gap [ directly under ] is crushed, both the transparent electrodes that meet contact, the electrode sheet of pressing-further middle is also pushed in, the gap [ directly under ] of it is also crushed, and the transparent electrode of the bipolar electrode sheet which meets, and the transparent electrode of the bottom electrode sheet which counters contact. If the multilayer laminating of the bipolar electrode sheet is carried out, a gap can be crushed over multistage like the following, both the transparent electrodes that counter can be contacted, and two or more contact of the transparent electrode can be carried out on the same coordinate.

[0023] If constituted on such a multistage touch panel, the contact of each stage can be made to be able to possess a sense-of-force feedback mechanism, therefore a mode of operation can also be changed for every contact.

[0024]

[Embodiment of the Invention] Hereafter, the operation gestalt of the input unit of this invention is explained using drawing.

[0025] Some cross-section side elevations of the two-step mold touch panel which used drawing 1 for this invention and showed the suitable decomposition perspective view of the two-step mold touch panel of the 1st operation gestalt and drawing 2 to drawing 1 , and drawing 3 are in the condition which assembled the two-step mold touch panel shown in drawing 1 . The cross-section side elevation showing the condition of having inputted the first phase with the finger, the cross-section side elevation of the two-step mold touch panel in the condition of having pressed drawing 4 further with the finger from the condition of drawing 3 , The thrust characteristic curve of the two-step mold touch panel of the 1st

operation gestalt which showed drawing 5 to drawing 1, The cross-section side elevation of the two-step mold touch panel with which drawing 6 added the sense-of-force feedback mechanism of the 2nd operation gestalt, The thrust characteristic curve of the two-step mold touch panel of the 2nd operation gestalt which showed drawing 7 to drawing 6, Other thrust characteristic curves of the two-step mold touch panel of the 2nd operation gestalt which showed drawing 8 to drawing 6, The block diagram of a processing circuit for the flow chart at the time of inputting drawing 10 by the two-step mold touch panel and drawing 10 to perform feedback to a user also including the two-step mold touch panel of this operation gestalt, and sense-of-force feedback, The block diagram of other processing circuits having shown deformation of the processing circuit which showed drawing 11 to drawing 10, and drawing 12 are the timing diagrams for explaining actuation of the processing circuit shown in drawing 11.

[0026] First, using drawing 1 thru/or drawing 3, it uses for the input device of this invention, and the multistage touch panel of 1 suitable operation gestalt is explained.

[0027] In addition, in the following operation gestalten, a two-step mold touch panel is illustrated and explained as one gestalt of a multistage touch panel. And the same sign is attached and explained to the same component as the component of the one-step touch panel of the conventional technique.

[0028] Moreover, as the term of [Description of the Prior Art] also explained this multistage touch panel, it is the input device used for small pocket mold information input devices, such as an information terminal, a car-navigation system, a computer, etc., and an example of the equipment is the same as that of what was shown in drawing 13. Therefore, in the following explanation, the drawing equivalent to drawing 13, drawing 14, and drawing 15 is omitted.

[0029] In drawing 1, sign 25A points out a two-step mold touch panel as a whole. This two-step mold touch panel 25A consists of the top electrode sheet 2510, the bottom electrode sheet 2520, the bipolar electrode sheet 2530 and upper case spacer 26a, and lower-berth spacer 26b. In addition, since the structure of the top electrode sheet 2510 and the bottom electrode sheet 2520 is the same as that of the thing of the conventional technique, those explanation is omitted.

[0030] The bipolar electrode sheet 2530 is the thing made of a transparent plastic in which this also had flexibility, antireflection films 2532 and 2533 are formed by the outside of the sheet base material 2531, and inside both sides, and transparent electrodes 2534 and 2535 are further formed by the front face of those antireflection films 2532 and 2533. And leader lines 2536 and 2537 are drawn by each transparent electrode 2534 and 2535, respectively. In addition, antireflection films 2522 and 2523 are film for controlling reflection of the transmitted light like antireflection films 2512, 2513, 2522, and 2523.

[0031] As a transparent plastic of the sheet base materials 2511, 2521, and 2531, elastic plastics like PET (polyethylene terephthalate), PMMA (acrylic: polymethyl methacrylate), PI (polyimide), PE (polyethylene), and polyurethane can be used. Moreover, transparent ingredients, such as glass, may be used for the lower sheet base material 2521. Furthermore, as transparent electrodes 2534 and 2535, an ITO (Indium Tin Oxide: indium stannic acid ghost) thin film etc. can be used like transparent electrodes 2514 and 2524 again.

[0032] Such a top electrode sheet 2510 of three sheets, the bottom electrode sheet 2520, and the bipolar electrode sheet 2530 As shown in drawing 3, use lower-berth spacer 26b on the bottom electrode sheet 2520, and the bipolar electrode sheet 2530 is supported. A predetermined gap is formed among both, upper case spacer 26a can be similarly used on the bipolar electrode sheet 2530, the top electrode sheet 2510 can be supported, and two-step mold touch panel 25A can be constituted by forming and assembling a predetermined gap among both. The 1st step touch panel is constituted from a top electrode sheet 2510, a bipolar electrode sheet 2530, and a gap Ga, and the 2nd step touch panel is constituted from a bipolar electrode sheet 2530, a bottom electrode sheet 2520, and a gap Gb, therefore a transparent electrode 2514 and a transparent electrode 2534 are the contacts of the 1st step touch panel, and a transparent electrode 2535 and a transparent electrode 2524 serve as a contact of the 2nd step touch panel. In addition, in drawing 3, illustration of all the antireflection films 2512, 2513, 2522, 2523, 2532, and 2533 was omitted.

[0033] Next, the device of two-step mold touch panel 25A of this operation gestalt of operation is explained using drawing 3 thru/or drawing 5.

[0034] First, when a user presses the front face of the top electrode sheet 2510 centering on near the input part on the occasion of an input with a finger 19, the press part is depressed, and becomes depressed and the transparent electrode 2514 of the top electrode sheet 2510 contacts the transparent electrode 2534 of the bipolar electrode sheet 2530 top (upper case point of contact calcium).

Furthermore, if it pushes in, as shown in drawing 4, the bipolar electrode sheet 2530 will be pushed on the top electrode sheet 2510, and will be crooked, and the transparent electrode 2535 will contact the transparent electrode 2524 of the bottom electrode sheet 2520 (lower-berth point of contact Cb).

[0035] When a user does the depression of the two-step mold touch panel 25A of this 1st operation gestalt with a finger 19, it has the thrust characteristic curve 2 as shown in drawing 5. At the time of a sign 2, the transparent electrode 2514 of the top electrode sheet 2510 contacts the transparent electrode 2534 of the bipolar electrode sheet 2530, energization takes place, and further, if the top electrode sheet 2510 is pressed, when the bipolar electrode sheet 2530 is pressed and a sign 5 shows, the transparent electrode 2535 of the bottom will contact and energize to the transparent electrode 2524 of the bottom electrode sheet 2520 in the process shown with a sign 4. If it pushes in further from here, it can tell that the two-step side contacted the user by giving a big inclination in the process shown with the sign 6. In addition, the dotted line showed collectively the thrust characteristic curve 1 of the one-step mold touch panel 25 of the conventional technique shown in drawing 20 to drawing 5 by reference.

[0036] This two-step mold touch panel 25A is the thing of structure which established two contacts on the same axis of coordinates unlike the one-step mold touch panel 25 of the conventional technique, and although the outstanding effectiveness is acquired, the contact time of the sign [ in / in \*\* / the thrust characteristic curve 2 ] 2 and a sign 5 is not clearly [ sensuously ] ascertained at a user -- a user can perform alter operation, without causing derangement to alter operation. In order to cancel this technical problem, if a visual operation and acoustic-sense-operation or a sense-of-force-operation is returned to a user, it will become much more effective. If a sense-of-force-operation is returned to a user's finger etc. especially, unlike vision or an acoustic sense, it can tell that surely the input was given to the user.

[0037] Two-step mold touch panel 25B of the 2nd operation gestalt equipped with the feeling feedback mechanism of the force was shown in drawing 6. The structure of the two-step mold touch panel 25B is explained using drawing 6.

[0038] Bobbin coil 35A which the aforementioned two-step mold touch panel 25A was being fixed to some front faces of a case 10 (a flat surface is a rectangle), the display panel 24 was held in the case 10 interior of that lower part, and this two-step mold touch panel 25B was fixed to it, and was wound around the square shape bobbin which is one of the actuators at the peripheral face of a case 10 is inserted in. In addition, also in this Fig., illustration of antireflection films 2512, 2513, 2522, 2523, 2532, and 2533 was omitted to two-step mold touch panel 25A.

[0039] It connects so that energization of the contact which consists of a transparent electrode 2534 which constitutes the contact and the 2nd step touch panel which consist of a transparent electrode 2514 which constitutes the 1st step touch panel, and a transparent electrode 2534, and a transparent electrode 2524 may be interlocked with and it may operate (after-mentioned drawing 10, drawing 11), and bobbin coil 35A is included in two-step mold touch panel 25B.

[0040] By constituting two-step mold touch panel 25B in this way, sense-of-force feeling is conveyed to a user. If the sense-of-force feeling is explained using drawing 7, as shown in drawing 3, a user When the top electrode sheet 2510 which is the 1st step touch panel is pressed with a finger 19, at the beginning [ the ] which was pressed with the elasticity of the top electrode sheet 2510 If the sign 1 with a curved small inclination is followed and the transparent electrode 2514 of the top electrode sheet 2510 and the transparent electrode 2534 of the bipolar electrode sheet 2530 contact in an inflection point 2 As bobbin coil 35A which is a sense-of-force device operated, and a user's finger 19 is put back to a user side, resists this putting-back force and was shown in drawing 4 Furthermore, if it pushes in, in an inflection point 4, will contact the transparent electrode 2535 of the bipolar electrode sheet 2530 and the transparent electrode 2524 of the bottom electrode sheet 2520 which are the 2nd step touch panel, and bobbin coil 35A will operate further to coincidence. As the sign 5 showed, a user's finger 19 is put back to a user side, and a user can perceive having been inputted as a sense of force. And it can tell that

followed this process of the big inclination shown with the sign 6 when it put back, the force was resisted and it continued pushing further, and two inputs were completed.

[0041] Although it constituted from 2 step mold touch panel 25B example shown in drawing 6 and drawing 7 as sense-of-force feedback mechanisms (bobbin coil 35A etc.) were added to each stage of the 1st step and the 2nd step of touch panel and there was a sense-of-force feedback response, this sense-of-force feedback mechanism may be added to one of touch panels. Drawing 8 is a thrust characteristic curve at the time of not adding a sense-of-force feedback mechanism to the 1st step touch panel, but adding a sense-of-force feedback mechanism to the 2nd step touch panel. When it does not operate, but it presses further and said contact of an one-step touch panel contacts, bobbin coil 35A operates and it is made for the putting-back force as shown in the finger 19 with the sign 5 to generate bobbin coil 35A, even if, as for the case of such a configuration, a user presses the top electrode sheet 2510 with a finger 19 and the contact of the 1st step touch panel contacts.

[0042] Make it better for vibration from which oscillation frequency, the amplitude, a wave, and a wave profile differ to return as a class of sense-of-force feedback response of said 1st step touch panel and 2nd step touch panel. If it does in this way, it will much more become easy to perceive that each stage was inputted certainly.

[0043] The flow chart in the subroutine which acquires ON-OFF and coordinate information was shown in drawing 10 as input from these two-step mold touch panels 25A and 25B. On a device, in order that an input signal may surely enter from the top electrode sheet 2510, input signal waiting of the top electrode sheet 2510 is performed first (S1). If an input signal enters from the 1st step touch panel (put together as the top electrode sheet 2510 and the bipolar electrode sheet 2530), first, a coordinate will be specified from the resistance (S2), and coordinate information will be written in RAM (Random Access Memory: record component which can be written). Furthermore, when the input standby from the 2nd step touch panel (put together as the bipolar electrode sheet 2530 and the bottom electrode sheet 2520) is started (S3) and an input is here, an input coordinate is specified from the resistance and (S4) and the 1st step coordinate data in RAM are rewritten to the 2nd step coordinate data. Moreover, since it expresses that the coordinate currently written in on current and memory is the 2nd step of input, a flag is written in (S5).

[0044] Next, the processing circuit for performing feedback to the user who also includes two-step mold touch panel 25B of the 2nd operation gestalt and a sense of force including the aforementioned subroutine work piece using drawing 10 is explained.

[0045] This processing circuit 30A consists of the memory 34 and the output units 35 which were called RAM for storing the central processing unit 33 and data containing a microcomputer etc. in addition to the aforementioned two-step mold touch panel 25B and the driver circuits 31 and 32 for a drive, and ROM. The output unit 35 consists of, the actuator as a display and a sense-of-force-output, for example, bobbin coil 35A, as the loudspeaker as an acoustic-sense-output, and a visual output. These outputs serve as a system which returns to a user, choosing the suitable output unit 35 according to the inputted actuation item.

[0046] At drawing 10, although driver circuits 31 and 32 were required respectively, as it was shown in drawing 11 to the touch panel of each stage, a driver circuit 37 can be managed with one by allotting a switcher 36 between two-step mold touch panel 25B and the common driver circuit 37, and controlling the change of the 1st step touch panel of two-step mold touch panel 25B, and the 2nd step touch panel with a central processing unit 33. This switcher 36 can receive the change information from the trigger circuit 38 which outputs a change signal a certain fixed period based on the base clock of a central processing unit 33, and can perform a serial change. The timing diagram in each phase at this time was shown in drawing 12. When the output voltage of a trigger circuit 38 is VH, the 1st step touch panel is connected with a driver circuit 37. On the contrary, when the output voltage of a trigger circuit 38 is VL, the 2nd step touch panel is connected with a driver circuit 37. Since these connection conditions are repeated by comparatively short time amount, for example, the period of several m seconds, two-step mold touch panel 25B can be used for a user without trouble on the real time.

[0047] This two-step mold touch panel 25A (or 25B) can be used, and a user can treat a device by more

nearly intuitive actuation by assigning a specific event to each time of the touch panel of each stage serving as ON and OFF. The examples of the event assignment in each ON/OFF time were enumerated to Table 1. If these functions are used combining the GUI (the abbreviation for Graphical User Interface) environment on a display screen, they are more effective. The combination of the function mentioned here is an example to the last, and it is possible to also add functions other than this. Moreover, on application software, a programmer can assign a function according to the gestalt of software, a tool, and a functional item.

[Table 1]

操作	1段目の割り当て機能		2段目の割り当て機能	
	押下	解放	押下	解放
電気的 状態	OFF →ON	ON →OFF	OFF →ON	ON →OFF
座標指定、選択	選択解除		—	指定された座標が 指し示すプログラムを実行
座標指定、選択	選択解除	指定された座標が 指し示す項目の一覧を表示	一覧表示の解除、 選択項目の実行	
座標指定、選択	選択解除	ドラッグ操作	ドロップ操作	
前方スクロール	前方スクロール解除	後方スクロール	後方スクロール解除	
画像の連続拡大	画像の連続拡大終了	画像の連続縮小	画像の連続縮小終了	
音量の連続増大	音量の連続増大終了	音量の連続縮小	音量の連続縮小終了	
項目の連続順送り	項目の連続順送り終了	項目の連続逆送り	項目の連続逆送り終了	
文字順列の連続順送り	文字順列の連続順送り終了	音量の連続逆送り	文字順列の連続逆送り終了	
メモリーアドレス番地の連続インクリメント	メモリーアドレス番地の連続インクリメント終了	メモリーアドレス番地の連続デクリメント	メモリーアドレス番地の連続デクリメント終了	
メモリー値の連続インクリメント	メモリー値の連続インクリメント終了	メモリー値の連続デクリメント	メモリー値の連続デクリメント終了	

As mentioned above, although two or more operation gestalten of illustration explained this invention, various kinds of modification by within the limits of the technical thought of invention which is not limited only to these operation gestalten and included in this application is possible for this invention. For example, with each aforementioned operation gestalt, although it is the thing of structure which established two contacts on the same axis of coordinates, it will be easily understood by increasing the number of sheets of the bipolar electrode sheet 2530 that the multistage touch panel which can form three or more contacts can be constituted.

[0048] Moreover, an actuator may not be limited only to a bobbin coil and may be a solenoid, a piezoelectric device, a motor, etc.

[0049] Furthermore, although the sense-of-force feedback mechanism was prepared in each stage in two-step mold touch panel 25B of said 2nd operation gestalt, it is also good to prepare only in the touch panel of one of stages again.

[0050]

[Effect of the Invention] It is main invention of this application maintaining the gestalt of the existing device, and making the 1st step touch panel based on an old input procedure, and a user loses causing derangement to alter operation. Furthermore, a user can direct by easy actuation and little finger actuation also to a complicated function by assigning the function of Table 1 to a two-step touch panel.

[0051] A user coming to be able to do quick alter operation and sensing stress according to these two points, decreases. Moreover, by combining with the feedback mechanism by the sense of force, a user's check of a screen decreases and he can perform quick alter operation now in each stage about a series of actuation to which it got used especially.

[0052] Moreover, the sense-of-force feedback mechanism is controlled by main invention of everything but this application by the command of a processor. Therefore, it becomes controllable from operation system and application software by uniformalizing with a software driver. Therefore, in addition to the output device by an existing acoustic sense and vision, a software manufacturer can create the software which utilized the sense-of-force device, and can offer software with larger power of expression. Moreover, a user can use software with more nearly friendly feeling to a device.

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[Translation done.]